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Numerical solution of the model problem of CCRF-discharge at atmospheric pressure

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Abstract

© The Authors, published by EDP Sciences, 2017. This work describes a 1D mathematical model of capacitive coupled RF discharge between symmetrical electrodes in argon at atmospheric pressure in a local approximation. Electrons, atomic and molecular ions, metastable atoms and argon dimmers as well as ground-state atoms are considered. A simplified diagram of argon excited states when two metastable and two resonance states are replaced with the uniform level. Such diagram is frequently used to simulate argon plasma due to efficient mixing of these layers at electron impacts. Velocity factors of electron impact processes were calculated using Boltzmann equation with a glance to electron-electron collisions. This work describes numerical algorithm of mathematical model implementation, which is based on finite-dimensional approximation of the problem using difference schemes together with iteration process. The software was developed to implement iterative processes using MatLab. Characteristics of atmospheric pressure capacitive coupled RF discharge at interelectrod distance 20 mm are calculated.

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